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## WATER WASTE ELIMINATION. METHODS AND RESULTS AT OAK PARK, ILL.<sup>1</sup>

BY H. P. T. MATTE

All will agree, no doubt, that the most important factor in the elimination of waste is complete meterage. This belief is held firmly in Oak Park, but the author will try to show that it must be supplemented by other measures in order to be entirely effective.

These have been divided into the following heads:

1. Strict maintenance of meters.
2. Rigid collection of high bills due to leakage or waste.
3. Efficient complaint department, to take care of complaints caused by excessive water bills. This includes education of consumers.
4. Master meter for measuring the entire supply to the distribution system. That is, a recording Venturi meter, or any of the various types of recording pitometers, with accompanying recording pressure gauges.

5. Periodical waste surveys.

To these may be added the following, important, although often overlooked, elements in the control of waste:

6. Absolute control of all the divisions of the water department by the manager.
7. Strict adherence to the rules and regulations, or ordinances. This means that the water department must be upheld by the municipal authorities. In other words, let the water works be out of politics entirely.

The foregoing rules have been in force in Oak Park, and to that fact the author ascribes the following results:

During the four-year period between 1913 and 1917 inclusive, although the population has increased 34.6 per cent and the number of services or meters 32.5 per cent; the daily consumption increased only 20.7 per cent. The daily per capita consumption has decreased from 75 gallons to 67.6 gallons, or 10.6 per cent, the minimum night

<sup>1</sup>Read before the Illinois Section at Urbana, April 18, 1918.

rate of consumption diminished 37.5 per cent and the ratio of the minimum night rate to the average daily consumption, dropped from 40.8 to 21.2 or 48 per cent. The percentage of water accounted for by meters has increased from 72 per cent to 83 per cent.

Oak Park has always been 100 per cent metered. All the water pumped into the distribution system, except that which is lost through underground leakage, is delivered through meters. This

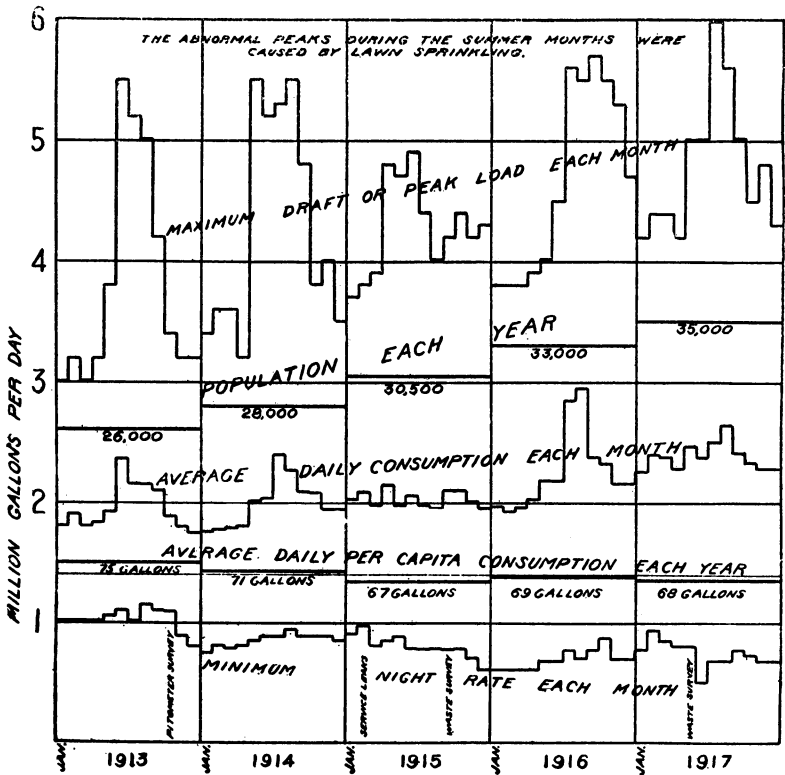


FIG. 1. WATER CONSUMPTION AT OAK PARK, ILL.

includes all municipal buildings, watering troughs, drinking fountains, street sprinkling water used in parks, and fire hydrants when used for other than fire purposes. Water used in the construction of houses is sold through meters buried in the parkway. Moreover there is no free water.

Referring to item 1, maintenance of meters, all meters are tested periodically, a practice which has been found profitable, although

not required by the Public Utilities Commission. Meters are read every quarter in a continuous reading system, for which purpose the city is divided into six districts so that those found to be not registering can be brought into the shop, repaired and put back into service within a week after being read.

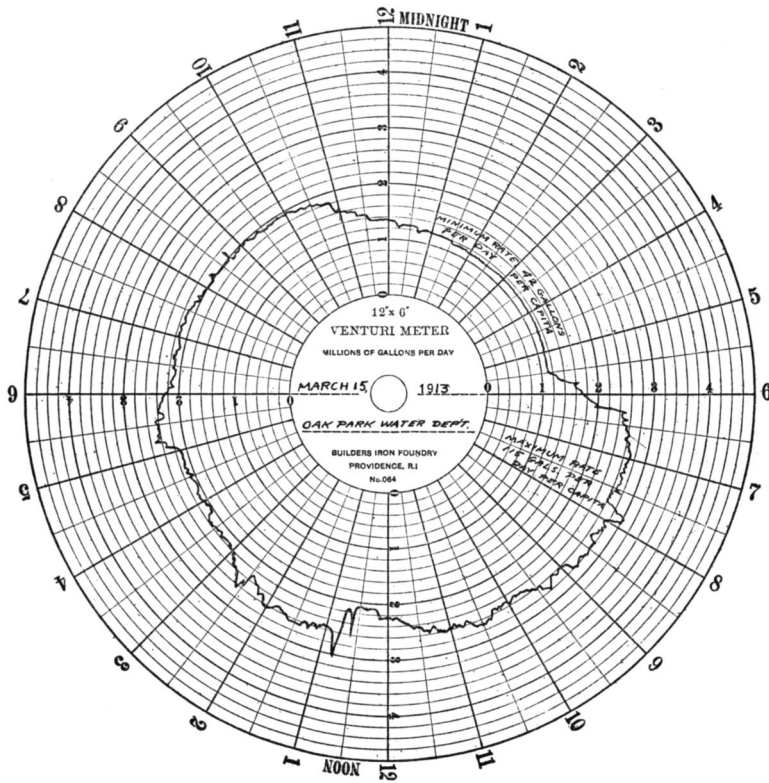


FIG. 2.

The second point, the rigid collection of high bills due to leakage, is important and has a beneficial effect on the success of the meter system. In other words, although it may be hard on the consumer, he will, if properly impressed, appreciate the importance of watching his fixtures and become educated in spite of himself.

No reduction in bills is made on account of leakage. Short and pointed instructions, which include the policy of the Water Department, are printed on the backs of the water bills. If the complain-

ant has been guilty of the characteristic failing of mankind, that of being unobserving and neglecting to read the information supplied to him every three months, he deserves to pay for his inattention.

This does not mean that the department is heartless and does not admit mistakes. The consumer is given the benefit of the doubt from the first, owing to the fact that the department realizes that it is but human and can be in error in several ways. In fact the department lets it be known that it is glad to correct its faults. If, however, upon thorough investigation it is found that the water was consumed through leakage or otherwise wasted, the bill must be paid. In order to be fair certain allowances are made if the waste was in the ground and invisible. In this case the lowest rate at which water is sold in Oak Park is allowed, although the quantity consumed may not justify the consumption to be placed in that class.

In any case of high bills, whether this concession is given or not, if the consumer is plainly unable to pay the bill as it stands (these claims being investigated), an installment plan of payment is adopted; but with the provision that the bill must be paid within a year.

The reason for this attitude is this; every student of human nature knows that if a water department is reputed to be lenient, the average person takes a chance and depends upon his ability as a bluffer to get out of paying the bill. Talk is cheaper than plumbing bills. If he is victorious because "he has been unfortunate and won't let it happen again," he surely will. In the old days of leniency it was found that the average consumer *did* do it again.

But it is impossible to handle this matter properly without an efficient complaint department, for it is then impossible for the department to prove its case. Every water works man who has had to deal with consumers under the meter system is aware of the number of excuses and prevarications that are evolved in order to make the management believe that there was a mistake made in the reading, that there are no leaks, that the fixtures have been repaired recently, that the meter works when no water passes through it, that the meter reader is in collusion with the "bunch of grafters in the office" and reads the meter from the next block, and so on.

Oak Park, however is prepared to prove to all these amateur lawyers that they have no case in court. There is a record of all complaints of whatever nature that have been made to the water

department and about the water department for the past five years. These are arranged by years in 3 by 5-inch card files, and are the original records. All calls are recorded on the same size cards, three colors being used to distinguish between complaints relating to meters and bills, complaints and job orders relating to the mechanical division, and those relating to delinquent bills. This record is very valuable in refuting unjust accusations, in tracing past records, and for the purpose of settling especially difficult problem.

All complaints concerning high bills are investigated and a comprehensive written report is made to the consumer. The nature of the complaint is written on the card provided for that purpose and is given to an inspector who makes a specialty of investigating high bills. It has been found impracticable for the meter reader to waste time making investigations. He notes all unusual sounds or evident leakage on the reading slip and a special call is made. Sometimes a consumer is dissatisfied even after a second investigation, and he is allowed to hold the payment of the bill until the next quarterly statement, when he will see for himself the result of stopping small leaks. If, however, a rebate is yet expected or sought, a final notice of "Shut off for non-payment" is issued and the water is shut off in spite of threats of litigation.

For the purpose of determining the cause of persistent high bills, where "there are only two in the family, no leaks, and there is no sprinkling done; while the family next door has three or four children, does its own washing, sprinkles the lawn all day, and has only minimum bills," the department has evolved a recording detector which is substituted for the meter and which gives a graphic record of the consumption for twenty-four hours or a week. It is thus possible to spot the number of times the faucets are opened, the number of baths with the quantity used each time, and the number of times the toilets are used. It has thus been possible on many occasions to show that the toilet valve would not work about every fifth time it was operated, and that the lady of the house was apparently too clean, having the habit of letting the water run in the kitchen sink too long each day or that somebody took a cold bath every morning and consumed about 50 gallons each day in the operation, or that a thermostat used by a central heating plant leaked at some time during the day, or that the toilet was used too often to wash down foreign substances that did not belong there, or finally that the servant was very wasteful.

The complaints on account of high bills dropped in number from 2000 in 1913, to 600 in 1917, due to the education of the consumers who, realizing that the department means business, is strictly impartial and is able to help them reduce their water bills, have begun to coöperate with the department.

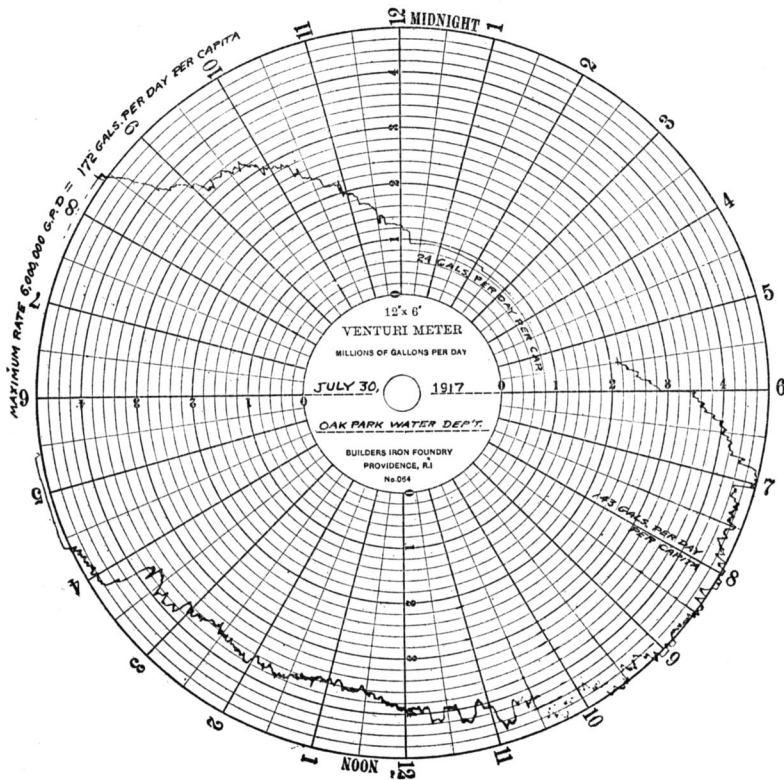


FIG. 3.

The third item in the efficient elimination of waste is the installation of recording pressure gauges and a master meter directly on the distribution system. The combination of the two devices is a great aid in estimating the rate of consumption during the night, which is due to leakage alone, in noting the progress each day in the stoppage of leaks, and in determining the necessity for making a special waste survey. The efficiency of the pumping station attendants as well as that of the pumps can be determined at a glance.

Many plants are equipped with Venturi meters or pitometer recorders placed on the main leading to filter beds, or to reservoirs or standpipes. The character of the consumption cannot be accurately determined by meters so placed that the fluctuations cannot be seen.

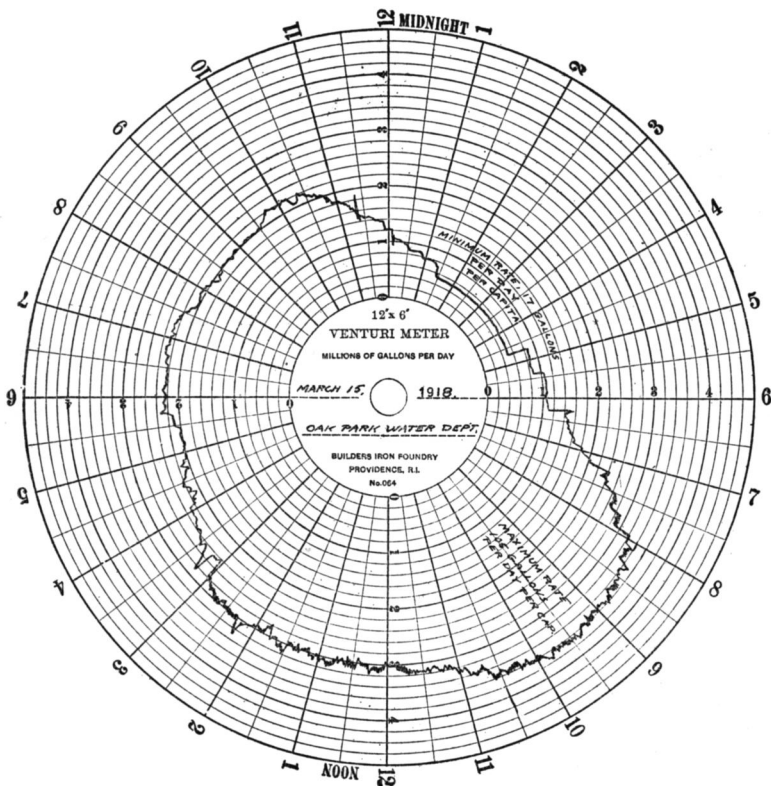


FIG. 4.

The waste survey, one of the most important elements in the prevention of continued needless waste on a metered water system, is next on the list, and the author hopes to see it become more popular.

In order to shorten the work of making waste surveys and avoid unnecessary work, it is advisable to make first a rough survey of the entire city with a pitometer, which is done by isolating certain districts and measuring all the water consumed through one of the



mains as a feeder. Here is where the master meter on the distribution system comes into use. The Oak Park department often shuts down large districts for a few minutes and notes the drop on the Venturi chart. It is impossible to do this at night because the quantity is only 400 gallons per minute between the hours of 1 and 4 a.m. In fact the smallest pump is so throttled in order to maintain the assumed pressure of 40 pounds that the opening left is equal in area to that of a 2-inch pipe. The Venturi meter is not sensitive enough at that low velocity; but it is possible to accomplish nearly the same result in the day time during periods of steady consumption when there is a draft of 2000 or 3000 gallons per minute. In this case the drop has been found sufficient to allow the making of an analysis of the leakage conditions. The pitometer is the surest way, however, for it is possible with it to obtain accurate information and so eliminate the "good districts."

After the pitometer survey, especially when the leakage is so small that there is little velocity in the mains, the "hydrant and hose method" follows logically. It is practically useless to expect any headway if a displacement meter is used, as the rate of consumption and the minimum flow cannot be accurately determined. The Oak Park department uses a 2-inch Venturi meter, but a pitometer inserted into a short piece of pipe 2 inches or smaller in size is as good. A manometer and as much condemned fire hose as can be obtained from the fire department, completes the outfit.

During the summer of 1917 the department tested 18 miles of mains, and stopped leakage amounting to 220,000 gallons per day. This represents a saving in the cost of water purchased from the city of Chicago, of \$5,000 and the outfit used cost only \$150, exclusive of the hose. It also accomplished the reduction of the night rate of consumption to the assumed standard of 20 per cent of the average daily consumption.

It has been the Oak Park experience that in order to be most efficient, a water department must be under one head. That is, not only should the manager take care of the mechanical end of the water works system but also the financial part. He should also inaugurate the policies. It is very difficult to handle complaints regarding high bills and to give satisfaction if the money is collected in one department, "shut-offs" for non-payment of bills are handled in another, and the bills are rendered in either of the foregoing or yet in a third one.

It is trying for the superintendent or manager to make a decision and be obliged to back down if the complainant is able to obtain a concession from someone higher up, who is not vitally interested in the efficient operation of the department and yields to pressure from some political adherent. It is difficult to enforce ordinances or rules if exception must be made in the case persons of influence or important political henchmen. It is impossible to prevent needless waste of water if certain organizations or institutions, by vote of the municipal authorities, are allowed free water against the advice of the manager.

The author acknowledges that absolutely nothing could be done toward the efficient management of the Oak Park water department were it not that the municipal authorities are intelligent business men who investigate all complaints thoroughly before acting upon them, and stand back of all the department's apparently arbitrary decisions, which, though they may cause temporary bad feeling, make for the betterment of the department. In short the department is able to live up to the water ordinance to the letter. It is not a mere scrap of paper.